

European corn borer and Bt corn: Keeping the technology working is a group effort

Written by: John Gavloski, Entomologist, Manitoba Agriculture

Bt corn varieties resistant to European corn borer will contain one or more Bt proteins, each of which are toxic to European corn borer in their unique ways. In Bt corn, these proteins go by names such as Cry1F, Cry1Ab, Cry1A.105, Cry2.Ab2. If populations of European corn borer are exposed to any one of these Bt proteins repeatedly, resistant individuals can eventually start to develop in the corn borer population, in spite of there being a refuge of non-Bt corn blended in or planted. The refuge is only the first line of defense. Over time these resistant individuals can become a large portion of the population, if the same Bt protein is used attempting to control them. The answer to this problem seems obvious – use another protein, or do something different.

In Nova Scotia in 2018, corn borers that were no longer being killed by Cry1F were detected. In the fall of 2022, European corn borer were collected in Nova Scotia near a field where Cry1F-resistant European corn borer were collected in 2018. Based on tests conducted at the University of Guelph, this population appears to have reduced susceptibility to the protein Cry1Ab. This really emphasizes the need for those selling and planting corn to understand how this type of resistance develops, the harm it can do to the industry, and roles we all have in reducing the risk of resistance.

There has been some indication of increased corn borer survival on Cry1F Bt corn by corn growers from Manitoba, based on samples that have been submitted to the University of Guelph, but there have not been any reports of unexpected damage. So corn growers and those scouting corn in Manitoba should make scouting for European corn borer and their feeding injury a high priority, even if it is a Bt variety they are growing. Report any unexpected damage you may find. Working together and early detections of potential issues makes managing the issues easier.



Figure 1. Eggs of European corn borer
Photo: John Gavloski, Manitoba Agriculture



Figure 2. European corn borer larva
Photo: John Gavloski, Manitoba Agriculture

Steps to minimize the risk of Bt-resistant corn borers

Good rotations: If you are using Bt corn varieties, make sure you are not using the same Bt toxin in successive years to manage European corn borer. This risks getting a resistant population developing in the province. The following table on Bt Corn Products Available in

Canada shows the Bt proteins that target European corn borer in commonly grown corn varieties: <https://cornpest.ca/transgenic-corn/#corn-available>

Using varieties with 2 or more proteins targeting European corn borer can help lessen the risk of resistance developing. You may also want to consider whether a Bt variety of corn is necessary if European corn borer has not been a major problem in recent years.

Shredding stalks: A good way to kill overwintering larvae of European corn borer is to use flail mowers to mow as close to the soil surface as possible to destroy the corn stalks, followed by burying the shredded stalks. This is something that is encouraged, particularly if unexpected damage is found. Shredding corn stubble can also reduce the population. Tilling corn stubble under without mowing or shredding it first is not as effective.

Keeping our Bt corn varieties as an effective tool to manage European corn borer is all of our responsibilities, and requires good rotations, including different Bt traits when Bt varieties are used repeatedly. Monitoring and knowing if unexpected damage by corn borers shows in your fields is also very important. And responding quickly should it occur helps keep the risk of widespread Bt resistance by European corn borer to a minimum.